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IS 14537 (1998): Polyethylene Terephthalate (Pet) Bottles for Packaging of Alcoholic Liquors [PCD 21: Plastics Containers]



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अल्कोहल के पैकेजिंग के लिए
पोलीइथाइलीन टेरीफथैलेट (पी ई टी)
बोतलों की विशिष्टि

Indian Standard

POLYETHYLENE TEREPHTHALATE (PET)
BOTTLES FOR PACKAGING OF ALCOHOLIC
LIQUORS — SPECIFICATION

ICS 55.100

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Plastics Containers Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Polylethylene terephthalate (PET) containers which are normally produced by stretch blow moulding operation are becoming popular on account of their glass like appearance, light weight and better barrier properties against moisture, carbon-dioxide, oxygen aroma and excellent organoleptic property. Recently their increasing use for packaging of alcoholic drinks in our country has led to the need of formulation of an Indian Standard on the subject. IS10106 (Part 1/Sec 1):1990 'Packaging Code: Part 1 Product packaging, Section 1 Foodstuffs and perishables' specifies the use of PET bottles for packaging of different types of alcoholic liquors and IS 10171:1987 'Guide on suitability of plastics for food packaging (*first revision*)' specifies the use of PET bottles for packaging of beer, wines and alcohols. However, to ensure the compatability of PET bottles for their shelf life a storage stability test has been included in this standard.

Indian Standard for glass liquor bottles has been separately published as IS1662 : 1972 'Glass liquor bottles (*second revision*)'.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

POLYETHYLENE TEREPHTHALATE (PET) BOTTLES FOR PACKAGING OF ALCOHOLIC LIQUORS — SPECIFICATION

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for polyethylene terephthalate (PET) bottles for packaging of alcoholic liquors.

2 NORMATIVE REFERENCES

The following Indian Standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	Title
2798 : 1998	Methods of test for plastic containers (<i>first revision</i>)
4905 : 1968	Methods for random sampling
7408 (Part 1) : 1984	Blow moulded polyolefin containers: Part 1 Up to 5-litre capacity
7511 (Part 4) : 1986	Dimensions for neck finishes : Part 4 Roll-on threads pilferproof (<i>first revision</i>)
8393 : 1977	Roll-seal pilferproof closures
12252 : 1987	Specification for polyalkylene terephthalates (PET and PBT) for their safe use in contact with foodstuffs, pharmaceuticals and drinking water
13193 : 1992	Polyalkylene terephthalates (PET and PBT) for moulding and extrusion

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 7408 (Part 1) shall apply.

4 MATERIAL

4.1 The bottles shall be made by injection stretch

blow moulding process from polyethylene terephthalate material (*see* IS 13193). The material shall be food grade according to the requirements laid down in IS 12252.

4.2 Cap

The bottles shall be provided with a cap which shall be of pilferproof type and made of either aluminium or a suitable plastics or a combination of plastics and metal (*see* IS 8393).

4.3 Wad

The wad, if required, shall be of cork board or pulp board or any other suitable material compatible with the contents.

5 SHAPE AND DIMENSIONS

5.1 The shape and dimensions of the bottles shall be as agreed to between the purchaser and the supplier. The specified overall height and diameter shall be measured according to the methods given in 4.1 and 4.2 of IS 2798.

5.2 Tolerance

The tolerances on various dimensions shall be as follows:

Up to and including 100 mm	±0.5 mm
Over 100 mm and up to and including 200 mm	±1.0 mm
Over 200 mm	±1.5 mm

6 NECK FINISH

The bottles shall be pilferproof having roll-on threads of the following neck sizes conforming to IS 7511 (Part 4):

31.5, 30, 28, 25, 22, and 20 mm.

The dimensions of 20 mm neck size is at present not covered in IS 7511(Part 4). The dimensions details for 20 mm neck size are given in Table 1.

Table 1 Dimensions of 20 mm ROPP Neck Finish

No. or Size	T		E		H		F		L		N	Angle	Thread Cutter Dia	Pitch
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
20	19.90	19.40	18.20	17.70	6.34	5.96	10.39	10.01	20.40	19.90	17.15	2.28	9.53	2.55

7 CAPACITY

7.1 Nominal Capacity

The bottles shall be of the following nominal capacities:

1 500, 1 000, 750, 500, 375, 250, 180 and 60 ml

7.2 Brimful Capacity

The brimful capacities of the bottles shall be as agreed to between the purchaser and the supplier. The tolerance on agreed capacities shall be as follows:

Nominal Capacity (ml)	Tolerance, ml
1 500	±15
1 000	±10
750	±7
500	±5
375	±4
250	±4
180	±3
60	±3

7.2.1 The brimful capacity shall be determined according to method given in 5 of IS 2798.

7.3 Wall Thickness

The minimum wall thickness of the bottle measured at any point according to the method given in 4.5 of IS 2798 shall be 0.20 mm. Mean of the readings at any location shall be taken as the wall thickness at that point.

7.4 Fill Point Capacity

The fill point capacity when determined by filling the bottle with water up to the specified depth measured from the top sealing surface shall be within the tolerance specified under 7.2.

8 MASS

The mass of the bottle shall be as agreed to between the purchaser and the supplier.

9 VERTICALITY

The variation in verticality when tested according to the method given in 7 of IS 2798 shall not be more than ±1.5 mm

10 WORKMANSHIP AND FINISH

The bottles and closures shall be manufactured in accordance with good manufacturing practices and shall be free from undesirable odour. The bottles shall be transparent (even if coloured), free from any flash and scratches.

11 TESTS

11.1 Leakage Test

11.1.1 Closure Leakage Test

The bottle shall be filled to its nominal capacity with

coloured water or the actual product, if necessary. After filling, the bottle shall be closed tightly as in the final form. The closed bottle shall then be kept upside down over a white blotting paper for 30 min. After 30 minutes, the bottle shall be examined for any leakage which would be evident from any visible stains on the blotting paper.

11.1.2 Vibration Leakage Test

The bottle filled with water at ambient temperature and closed tightly with the cap when subjected to vibration on a vibration table according to method given in 6.2 of IS 2798 shall not show any leakage through the closure after one hour of testing.

11.2 Drop Impact Test

11.2.1 The bottle with the cap when subjected to the drop test according to method 8 of IS 2798 shall not show any sign of cracking. Slight deshaping of the body shall not render the bottle unacceptable in the test.

11.3 Stack Load Test

11.3.1 The bottles shall be of sound construction and shall not show any cracks or permanent buckling when subjected to test according to method given in 9 of IS 2798.

The total superimposed load along with the load of the flat surface for different sizes of bottle shall be as given in Table 2.

Table 2 Details of Stack Load

Nominal Capacity (ml) (1)	Stack Load for 4 Bottles(N) ¹⁾ (2)	Load/Bottle (N) ¹⁾ (3)
60	80	20
180	160	40
250	240	60
375	240	60
500	320	80
750	400	100
1 000	400	100

¹⁾ N = 0.101 972 kgf.

11.4 Storage Stability Test

11.4.1 This shall be a type test. The test shall be carried out both at $38 \pm 1^\circ\text{C}$ and 90 ± 2 percent RH (accelerated conditions) and $27 \pm 1^\circ\text{C}$ and 65 ± 2 percent RH (standard conditions). The alcohol content and other chemical requirements shall be determined at the initial stage, at the end of 3 months under accelerated conditions and at the end of 12 months when tested under standard conditions. The PET bottles shall be considered to have met the requirements of the test if alcohol content is not less than the minimum permissible limits and other chemical requirements are not more than the maximum

permissible limits prescribed in the relevant Indian Standards for alcoholic drinks.

12 MARKING

12.1 Each bottle shall be marked with:

- name of material (PET);
- recycling symbol, that is;
- nominal capacity in ml; and



PET
POLYETHYLENE
TEREPHTHALATE

- manufacturer's name and/or his recognized trade-mark, if any.

12.2 BIS Certification Marking

Each bottle may also be marked with the Standard Mark.

12.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act 1986*, and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

13 SAMPLING

The method of drawing representative sample from a lot and the determination of criteria of conformity of a lot to requirements of this specification shall be as prescribed in Annex A.

ANNEX A

(Clause 13)

SAMPLING

A-1 SCALE OF SAMPLING

A-1.1 Lot

In any consignment all the bottles of the same material, nominal capacity and drawn from a single batch of manufacture shall be grouped together to constitute a lot.

A-1.2 Scale of Sampling

For ascertaining the conformity of the lot to the requirements of this standard, tests shall be carried out for each lot separately. The number of bottles to be sampled from a lot shall be in accordance with Table 3.

A-1.3 The bottles shall be selected at random from the lot. To ensure the randomness of selection, methods given in IS 4905 may be followed.

A-2 CRITERIA FOR CONFORMITY

A-2.1 Visual Examination

The sample bottles selected as per col 2 of Table 3 shall be examined for manufacturing conditions (see 10). Any containers failing in one or more of the requirements shall be termed as defective. The lot shall be accepted under this head if the number of defective bottles in sample does not exceed the acceptance number given in col 3 of Table 3.

Table 3 Scale of Sampling and Acceptance Number

(Clauses A-1.2, A-2.1, A-2.3 and A-2.5)

Lot Size	Workmanship and Finish		For Closure Leakage Test and Vibration Leakage Test		For Overall Height, Diameter, Wall Thickness and Verticality
	Sample Size	Acceptance Number	Sample Size	Acceptance Number	No. of Samples
(1)	(2)	(3)	(4)	(5)	(6)
Up to 500	13	1	5	0	2
501 " 1 000	20	2	8	0	2
1 001 " 3 000	32	3	13	0	2
3 001 " 5 000	50	5	20	1	3
5 001 and above	80	7	32	2	5

A-2.2 Brimful Capacity, Fill Point Capacity, and Bottle Mass

For the purpose of above tests, five bottles for lot size up to 5 000 and 10 bottles for lot size above 5 000 shall be selected at random from the samples already drawn according to A-1.3. Each of the sample bottles shall be subjected to tests for brimful capacity (7.2), fill point capacity (7.4) and bottle mass (8). There shall be no failure if the lot is to be accepted under this clause.

A-2.3 Test for Closure Leakage and Vibration Leakage

The number of sample bottles to be drawn shall be in accordance with col 4 of Table 3. Each of the

sample bottle shall be subjected to closure leakage test. The number of failure shall not exceed the acceptance number given in col 5 of Table 3.

A-2.4 Drop Impact Test and Stacking Test

One set of sample bottles as given in the test methods (11.2 and 11.3) shall be drawn from the lot and these shall be subjected to the respective tests. The sample shall pass the tests for acceptance of the lot in respect of drop impact and stacking requirements.

A-2.5 The sub-sample of size given in col 6 of Table 3 shall be subjected to overall height and diameter, wall thickness and verticality. No failure shall occur for acceptance of the lot under this clause.

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